Answers to reviewer comments RC2 from Anonymous Referee #1 on amt-2023-258

General comments:

This article on the applicability of the inverse dispersion method for measuring emissions from animal housing is exemplary in its writing and argumentation. The clarity and coherence of the content make it a valuable contribution to the field. However, the review identifies two notable drawbacks – (1) the challenge of frequently suboptimal atmospheric conditions and the limited range of conditions considered, (2) the use of the threshold distance/fetch which is usually based on the dominant obstacle height (rather than the source height). Concerning the latter one, I would argue that the tree (15 m) is the dominant wind obstacle rather than the barn itself. The discussion (chapter 4) would be further enriched by incorporating more literature, providing a more comprehensive context for readers. Despite these considerations, the article stands out as a well-crafted and insightful exploration of emission measurement methods.

We thank the Referee #1 for the feedback. We would like to comment the three points mentioned.

(1). For Swiss conditions, the atmospheric conditions were quite optimal. Often there are only low wind speeds ($u < 1$ m s^{-1}). The release phases cover stable, near neutral and unstable atmospheric conditions and thus the main range of conditions. Having more data would be preferable, however, the project budget did not allow to release methane for a longer time.

(2). We agree with the reviewer and have related the fetch to the tree height throughout the manuscript.

(3). Further literature was added in Section 4.3 to place our study into these earlier lines of thinking and providing more context for the readers.

Specific comments:

line 25: The introduction could benefit from more recent literature (e.g. instead of Stocker et al., 2013 and Gerber, 2013)

We updated the IPCC technical summary of AR5 with AR6 and added an additional source (lines 24-26). However, we think that Gerber et al, (2013) is still a relevant source and gives a good overview on the topic.

line 100: please provide further information on the device specific relationships as it is important for the accuracy of the concentration measurements

We added a Section 3.1 about the precision of the OP and the concentration enhancements during the release.

line 110: please define the input parameters for the model

We added all input parameters to Section 2.6.

lines 120/145/215/240: An important scale to determine the distance between source and the downwind measurement location is the height of the largest wind obstacle. When comparing to other studies, it is essential to include the fetch based on the tree height rather than the barn height.

We agree with the reviewer and changed the distances of the instrument to fetches related to the tree throughout the manuscript.

Table 3: I find the term “All UA” and “All OP” misleading. Isn’t it a mean/median value of the considered options?

This table was restructured, and the mentioned row and column were removed. It was the median, if all the data were considered and not the mean/median of the values given in the table.

Line 205: I appreciate the approach of a sensitivity analysis. But then other parameters should be considered as well (and not only the rotation of the wind direction).

Following the recommendations of Referee #2, the entire section was removed from the manuscript.

Line 225: Despite the influence of the barn and tree, the recovery rates did not substantially differ.

Based on the recommendations of Referee #2, only recovery rates from the ultrasonic anemometer placed upwind of the barn are shown in the main manuscript and the recovery rates determined with the UA located downwind of the barn and tree were moved to the supporting information SI-7. Thus, this sentence was removed from the manuscript.

Line 245: It may be worth to conduct a sensitivity analysis for several parameters instead of using only one – the rotation of the wind direction

We removed this part as it is too involved to accurately simulate sensitivity to different parameters for the given setup.

Line 275: Delete the second “with” in the sentence “Other IDM studies have shown ….”

The second "with" was removed.